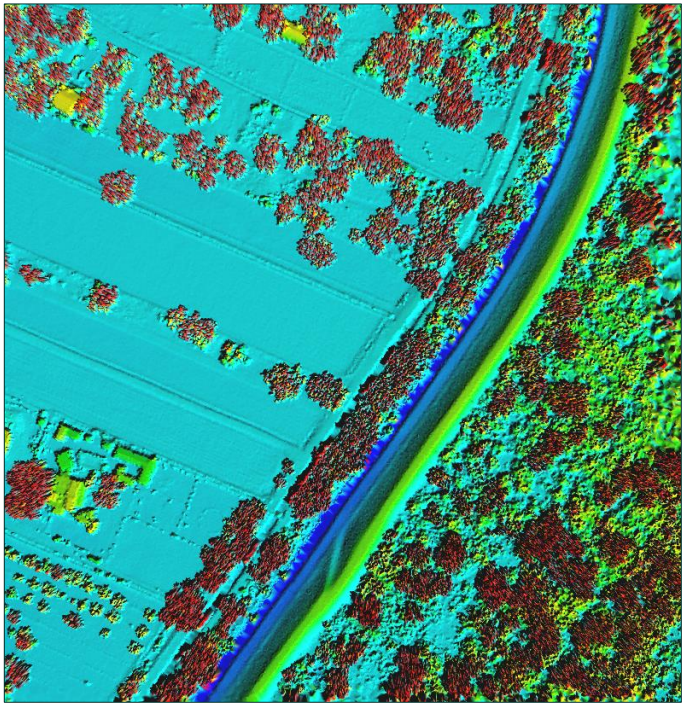
New Mexico Statewide Lidar Acquisition

NM Elevation Data Planning and Acquisition Subcommittee
NM Geospatial Advisory Committee

Subcommittee Members

Subcommittee Chair: Mike Inglis, UNM EDAC
NM GAC Chair: Gar Clarke, NM DoIT
Mike Timmons, NM Bureau of Geology
Caeri Thomas, Mid-Region Council of Governments
Erle Wright, Santa Fe County
Paul Neville, UNM Earth Data Analysis Center
Chandra Bales, UNM Earth Data Analysis Center
John Peterson, USACE
Matt Dorsey, US BOR
Candace Bogart, USFS
Kerri Mich, US NRCS

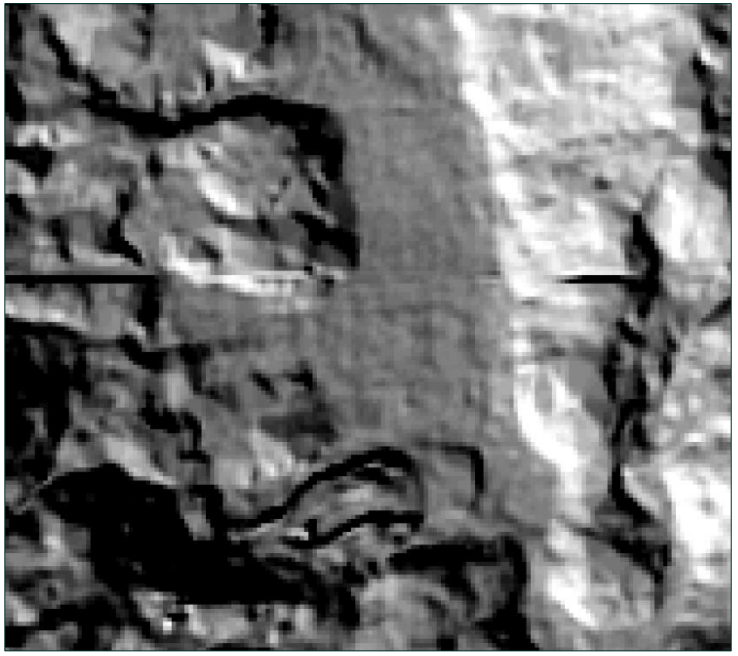


Corrales (MRCOG 2010) Classified by Elevation

New Mexico Elevation Data—Out of Date and Out of Sync

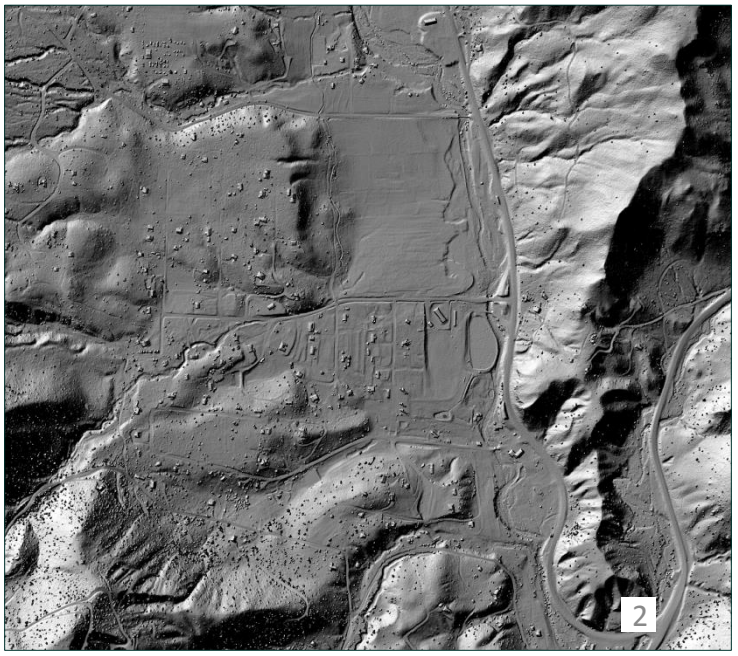
Existing Elevation Data Sets

- Out of Date: Most > 40 yrs old
  Data range from 15 yrs old to > 70 yrs old
- Spatial Resolution: 33 ft (10 m), 98 ft (30 m)
  Vertical Accuracy: 3.3–6.6 ft (1–2 m)
  to 36–131 ft (11–40 m)
  to Unknown



La Cueva and Surroundings
10-m DEM (NED)
Hillshade

2000 feet



La Cueva and Surroundings
Lidar Last Return
Hillshade

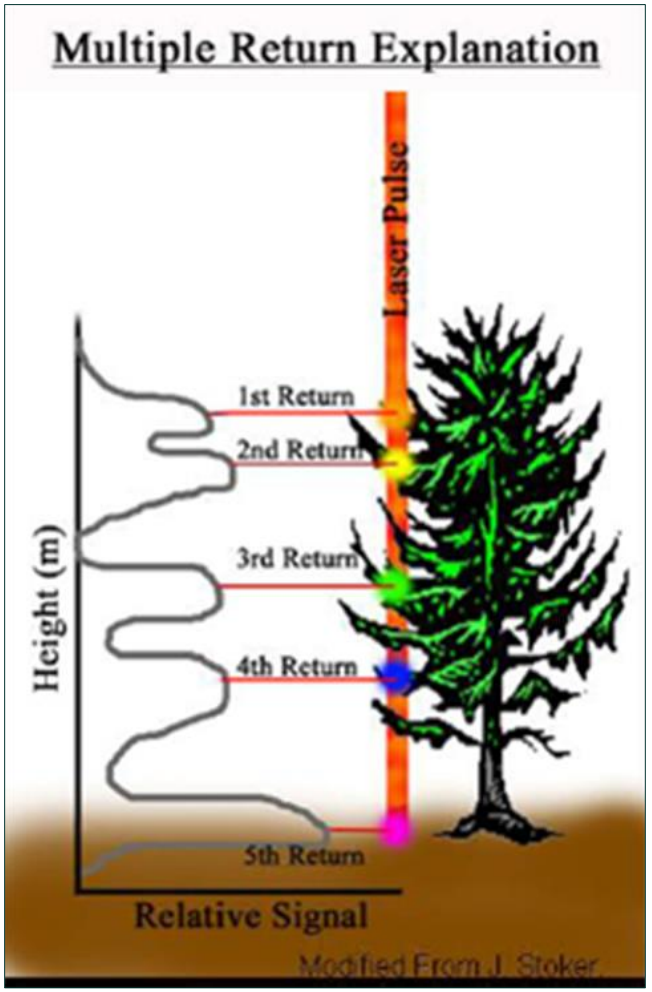
Quality Level 2 (QL2) Lidar Data Sets

- Spatial Resolution: 2 ft or better
  Vertical Accuracy: 3.9 in (10 cm) or better

Interactive image comparisons:
https://edac.unm.edu/projects/lacueva/

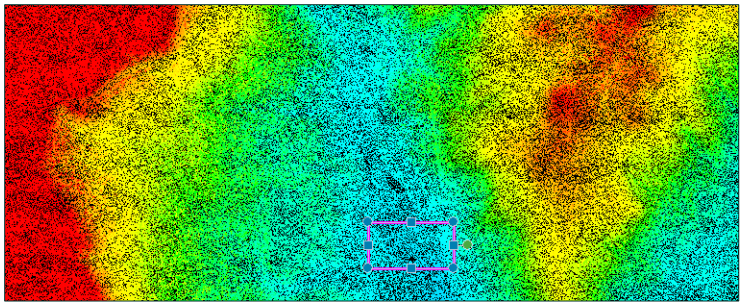
Better Land Characterization → More Accurate Results!

What is lidar?



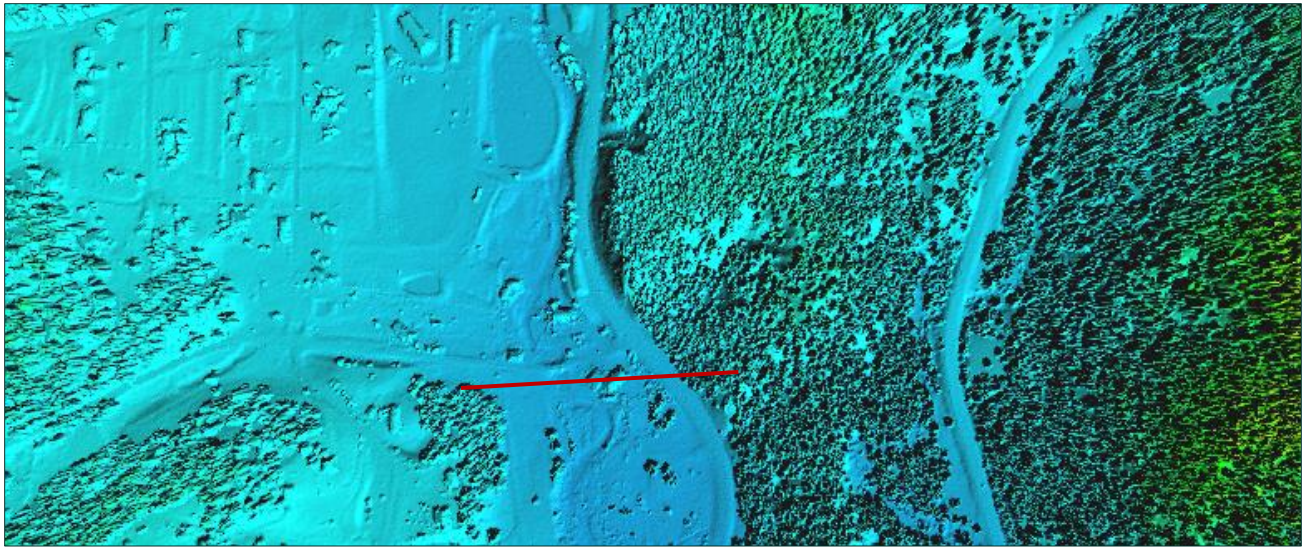
- lidar: light detection and ranging
  - sometimes called 3D laser scanning
  - or laser elevation profiling
- Lidar measures distances to the Earth using laser pulses
- Processed pulses give precise 3D info about surface shape and features
- Result: A dense, detail-rich cloud of elevation points
- Point clouds yield many geospatial products: 1-ft Contours, 2-ft Bare Earth DEMs, Digital Surface Models (forest canopy, floodplain maps, urban canyon surface, structure surface, building footprints, etc.), Elevation Profiles, Detailed Hillshade/Slope/Aspect Maps …

Lidar Products



Lidar Point Cloud, Colored by Elevation

La Cueva Area (Valles Caldera Project, 2010)



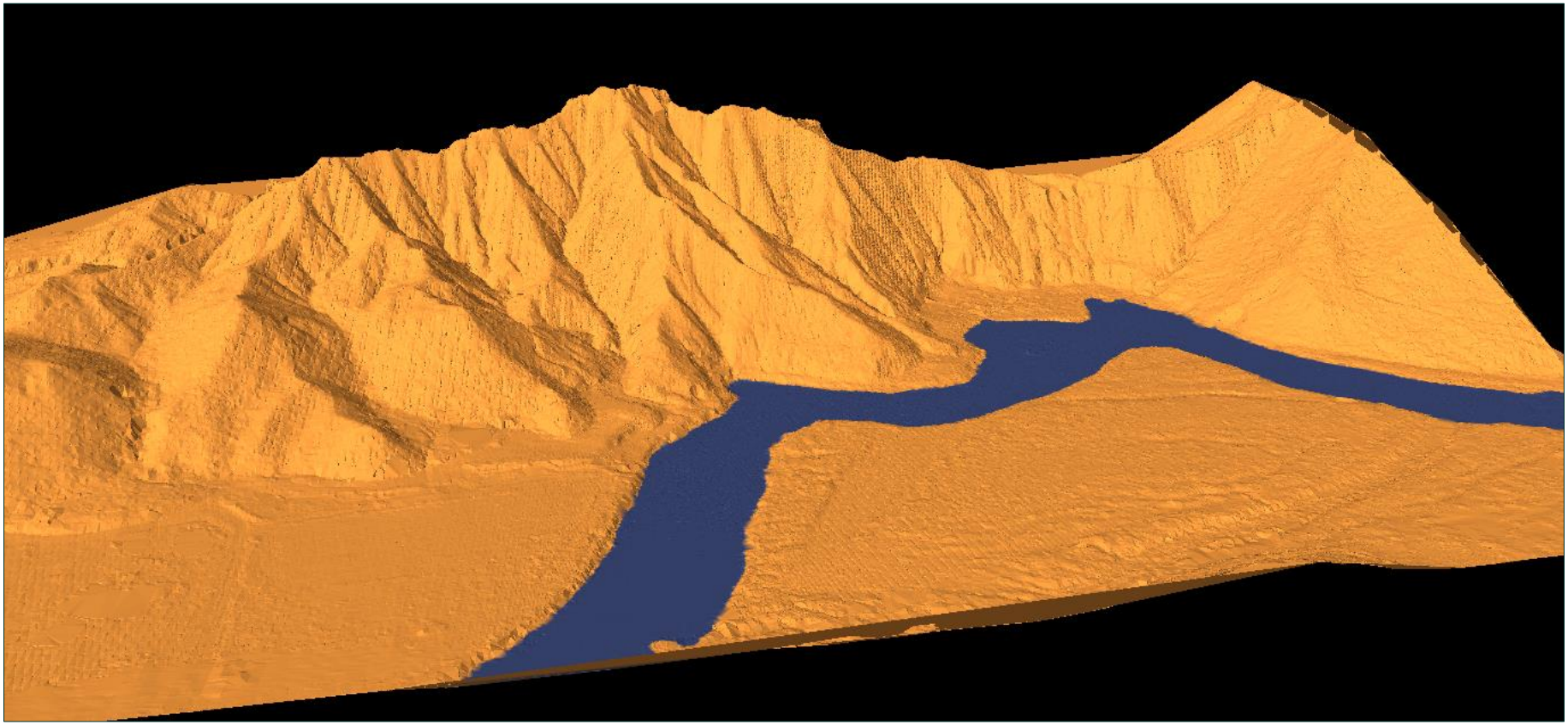
Surface Model

Side-View Profile

Lidar Products from the Santa Fe County Project: Embudo

Perspective View of Embudo Area: NW to SE, across Rio Grande

Santa Fe County Project 2014, QL2 Lidar Data



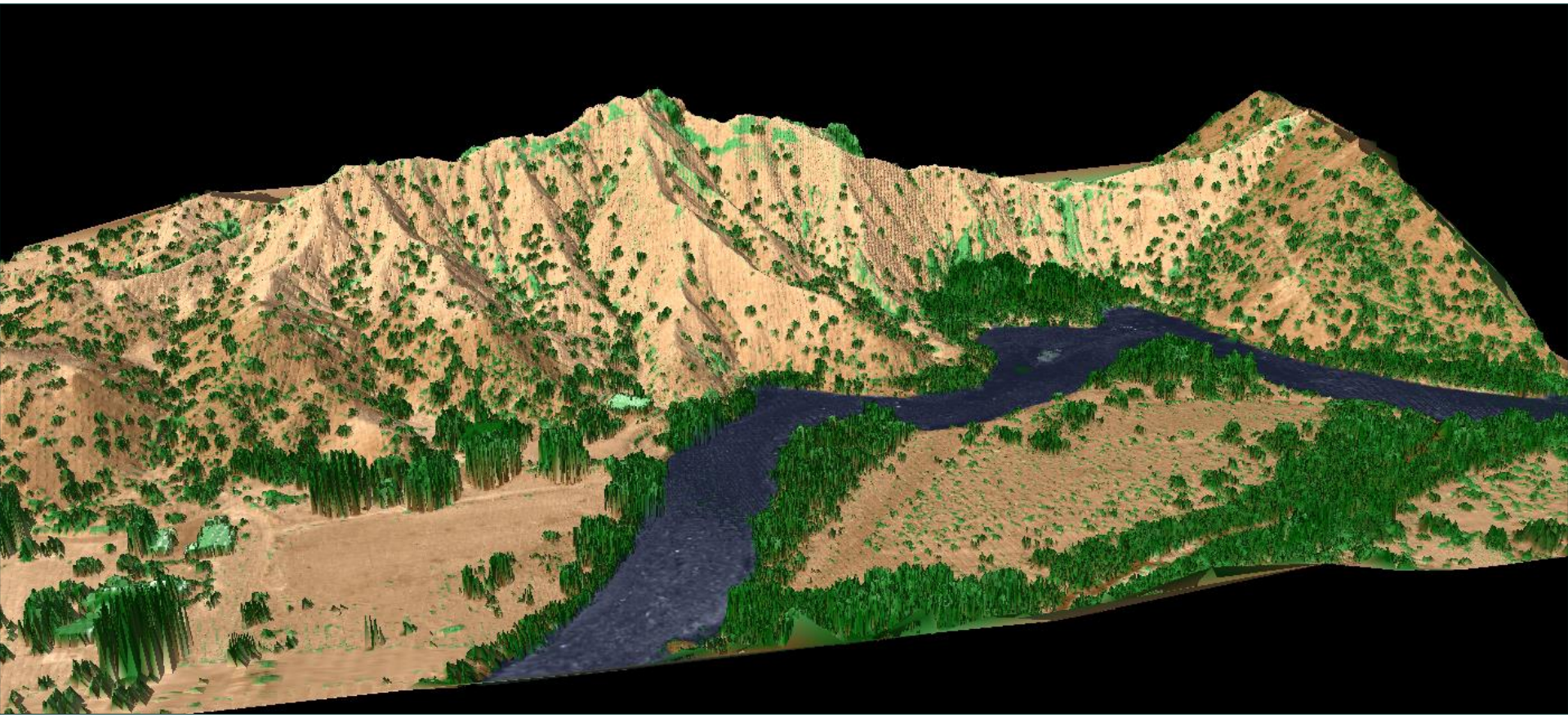
Blue: Water Brown: Ground Points

View using TIN Surface (image width: 0.5 mile elevation difference: 150 ft)

Lidar Products from the Santa Fe County Project: Embudo

Perspective View of Embudo Area: NW to SE, across Rio Grande

Santa Fe County Project 2014, QL2 Lidar Data



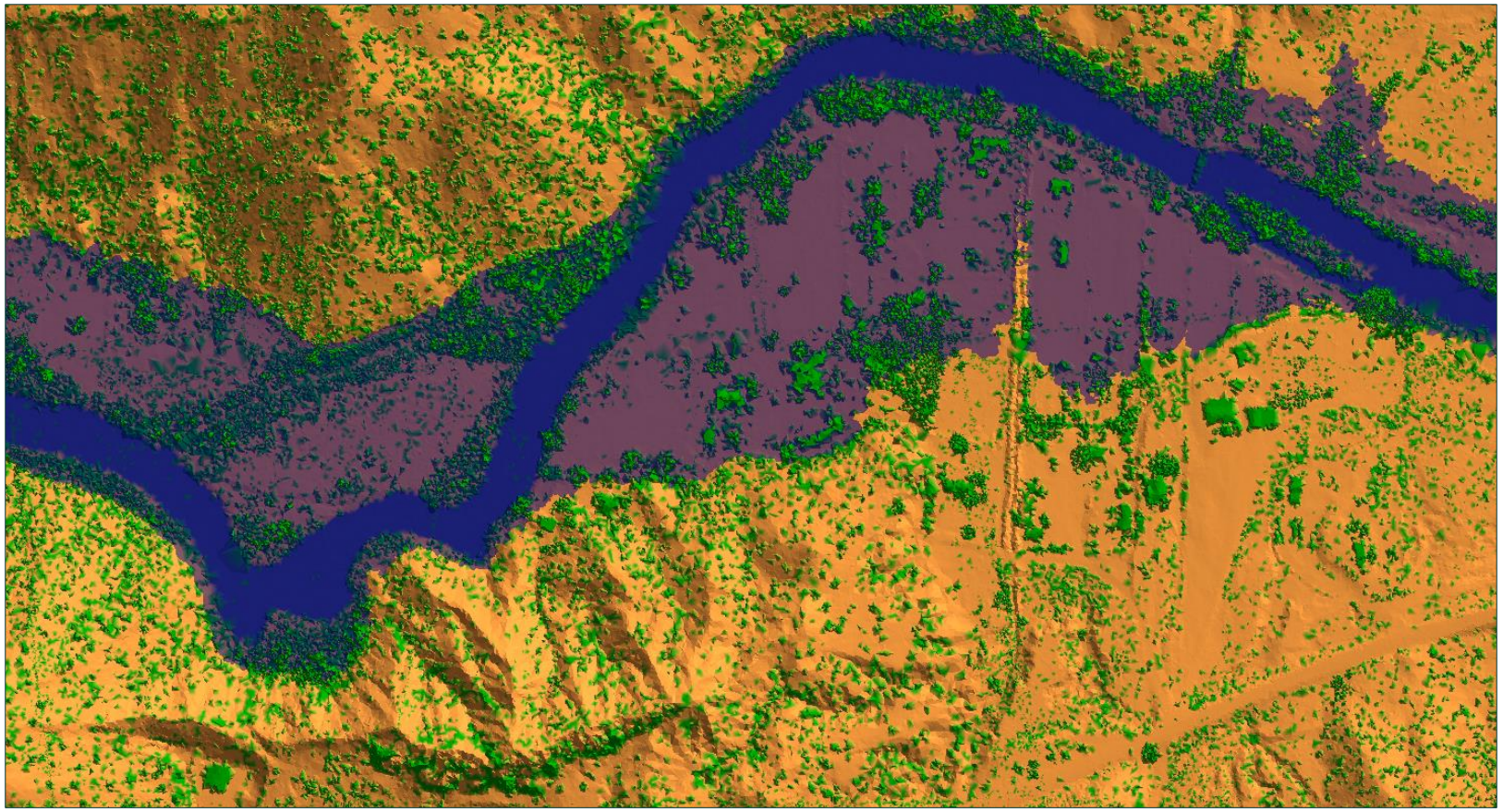
Blue: Water Green: Trees, Shrubs, some Buildings Brown: Ground Points

View using TIN Surface blended with Intensity Layer

Lidar Products from the Santa Fe County Project: Embudo

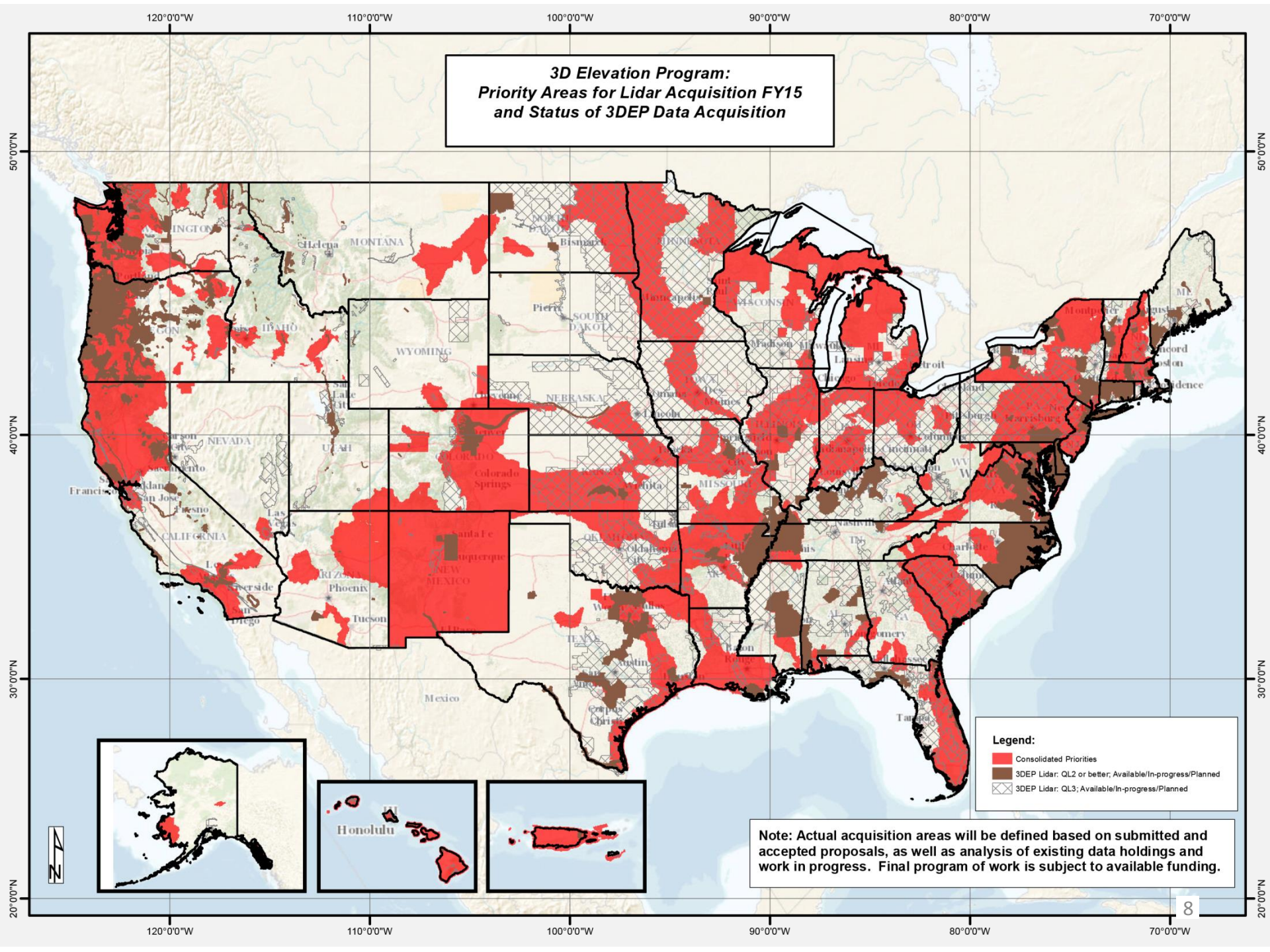
Planimetric View of Embudo Area, across Rio Grande

Santa Fe County Project 2014, QL2 Lidar Data



Blue: Water Purple: Projected Flooding—water 30 ft over riverbanks

View using TIN Surface


3D Elevation Program:
Priority Areas for Lidar Acquisition FY15
and Status of 3DEP Data Acquisition
120°0'0"W
110°0'0"W
100°0'0"W
90°0'0"W
80°0'0"W
70°0'0"W
50°0'0"N
40°0'0"N
30°0'0"N
20°0'0"N
Legend:
Consolidated Priorities
3DEP Lidar: QL2 or better; Available/In-progress/Planned
3DEP Lidar: QL3; Available/In-progress/Planned
Note: Actual acquisition areas will be defined based on submitted and accepted proposals, as well as analysis of existing data holdings and work in progress. Final program of work is subject to available funding.
Honolulu
Mexico

NM Lidar Update

- Santa Fe County
- Rio Hondo/Animas
- Curry/Roosevelt Counties
- Taos County
- Not QL2 and/or
  Not Publicly Available

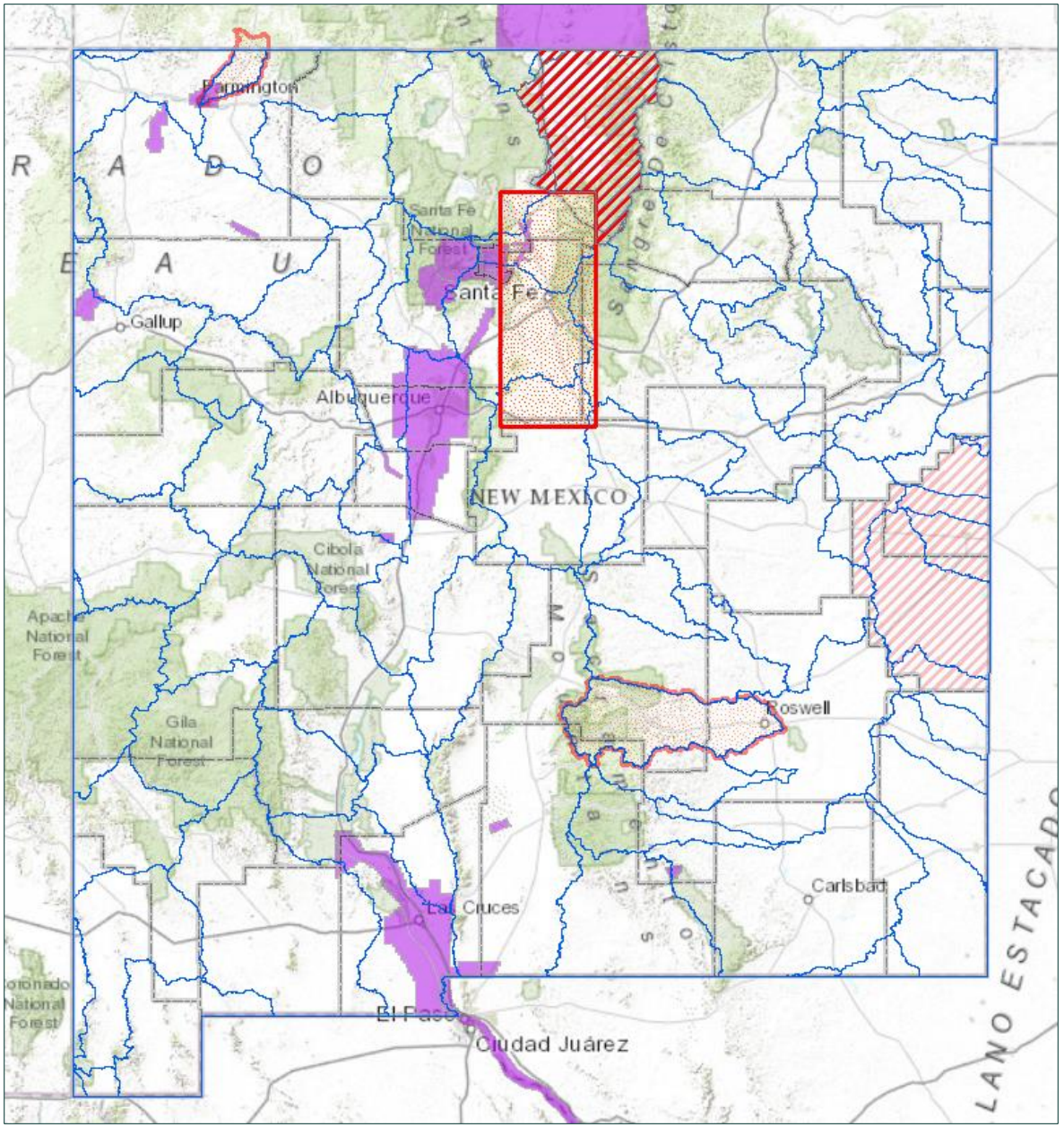
Funding Sources:

Santa Fe County
  County, some USGS

Rio Hondo/Animas Watersheds
  FEMA

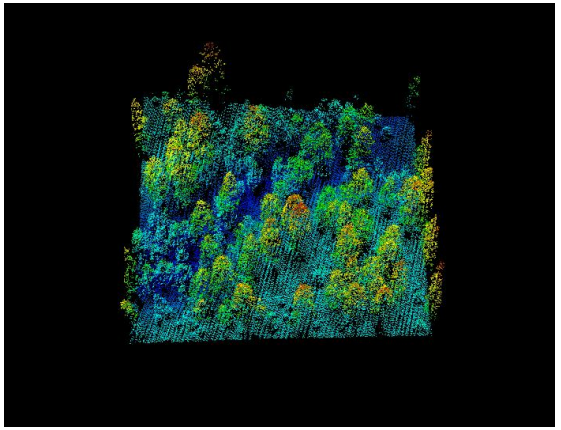
Curry/Roosevelt Counties
  NRCS, some USGS/FEMA

Taos County–Upper Rio Grande Watershed
  FEMA, some USGS



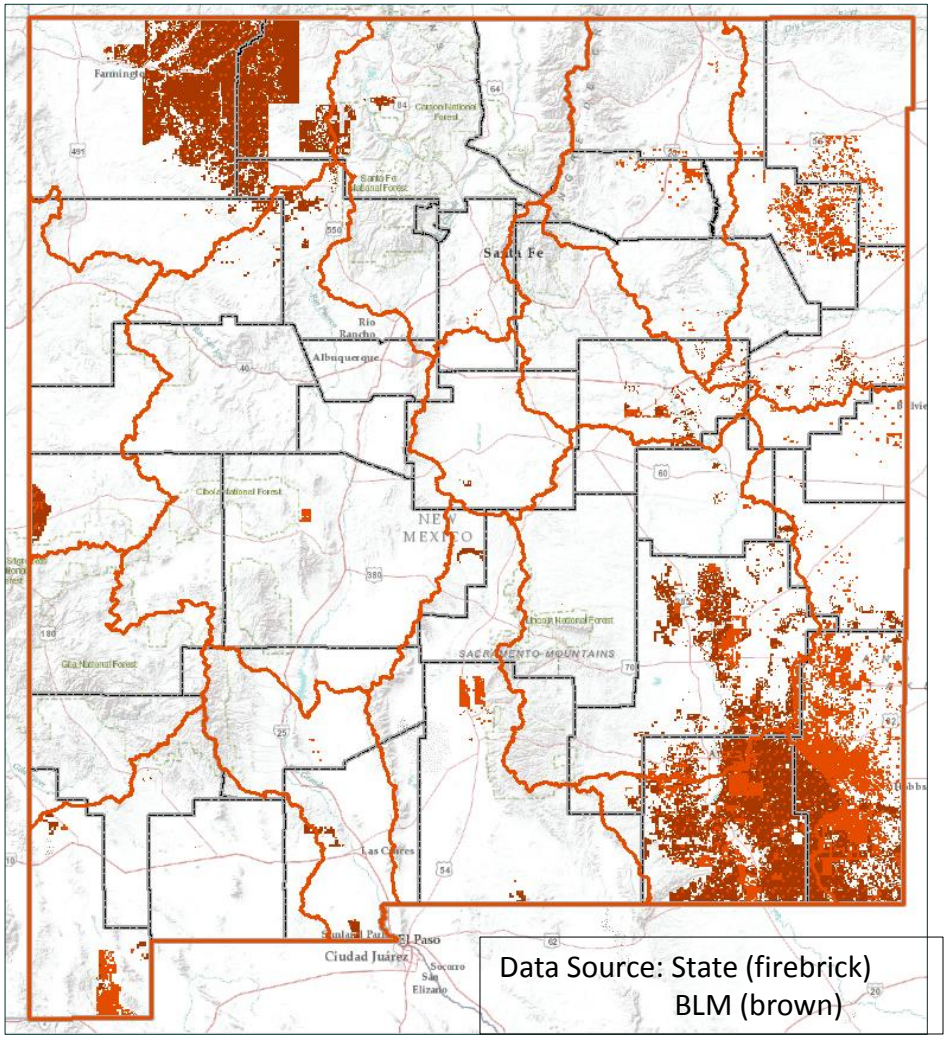
Value to New Mexico from Enhanced Elevation Data (QL2 Lidar Data)

- New Mexico's Greatest Concern: **WATER**
  watershed, drainage, runoff, drinking water, irrigation, flooding, floodplain, evaporation, water resource protection and delivery …
- Economic Development and Tourism
- Wildfire and Urban Impacts
  flood hazard/risk, emergency response/mitigation, fuel load, access, recovery …
- Transportation and Utility Corridors
- Urban Growth and Planning
- Forest Management
  restoration, thinning to increase water yield, post-fire mass wasting …
- Energy Development
  oil and gas, solar, wind
- Homeland Security and Defense
  military installations, national laboratories, WIPP, 200-mi border with Mexico
- Tribal Lands
- Agricultural Demands
  irrigation, grazing, dryland farming …

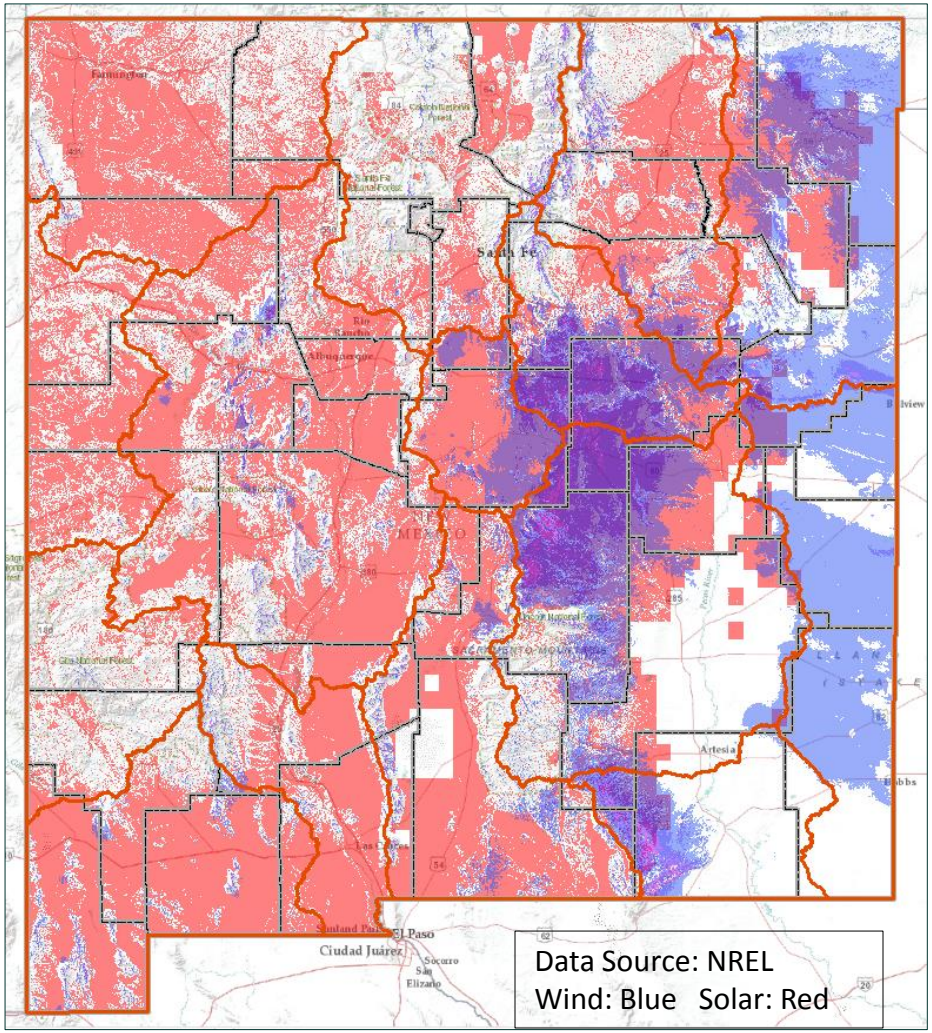


LiDAR over Coconino Forest from NAU

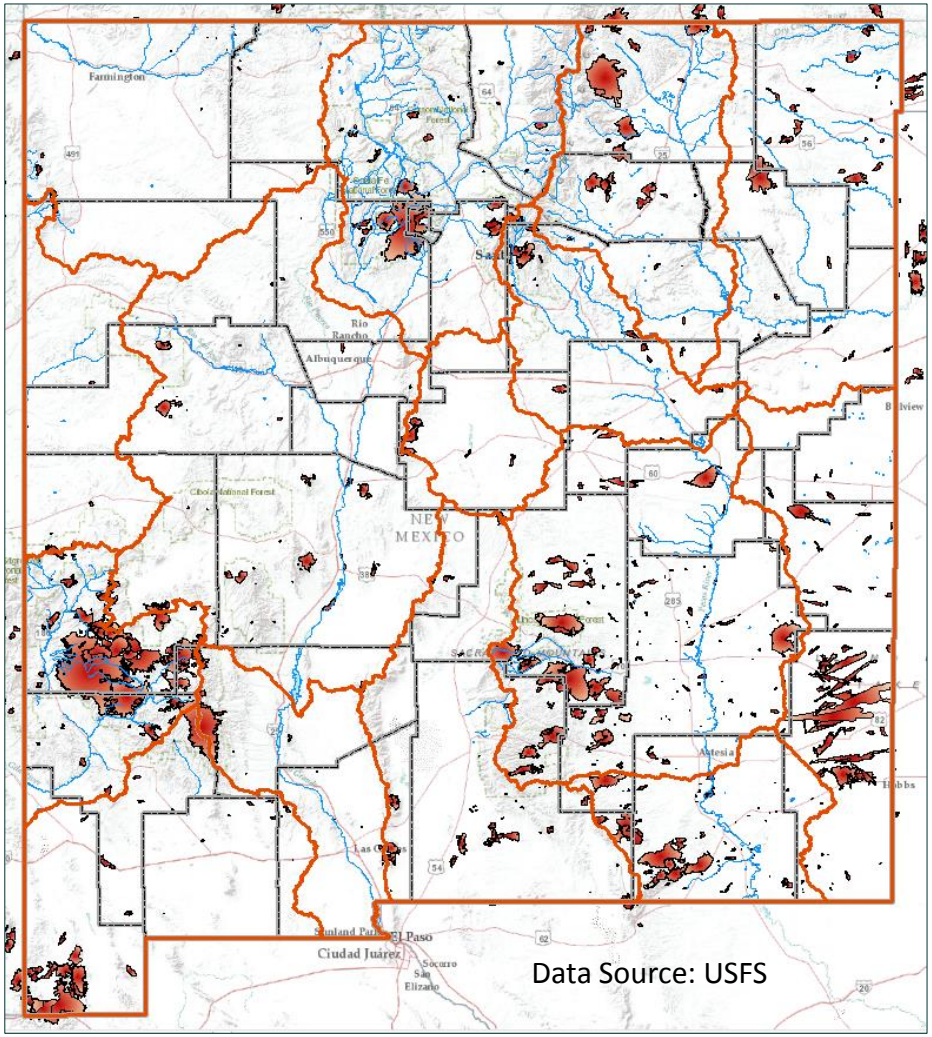
Active Oil & Gas Leases



Potential Wind / Solar Sites

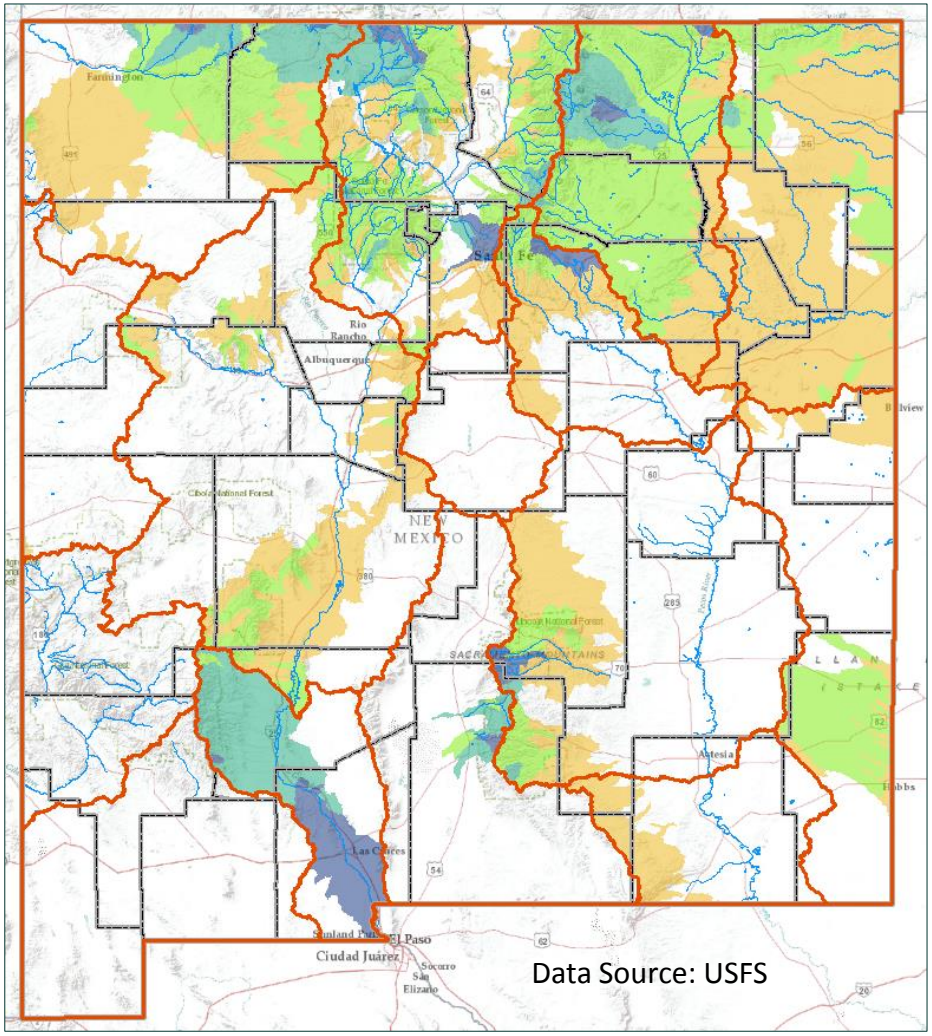


Wildfire Footprint, 2000–2013



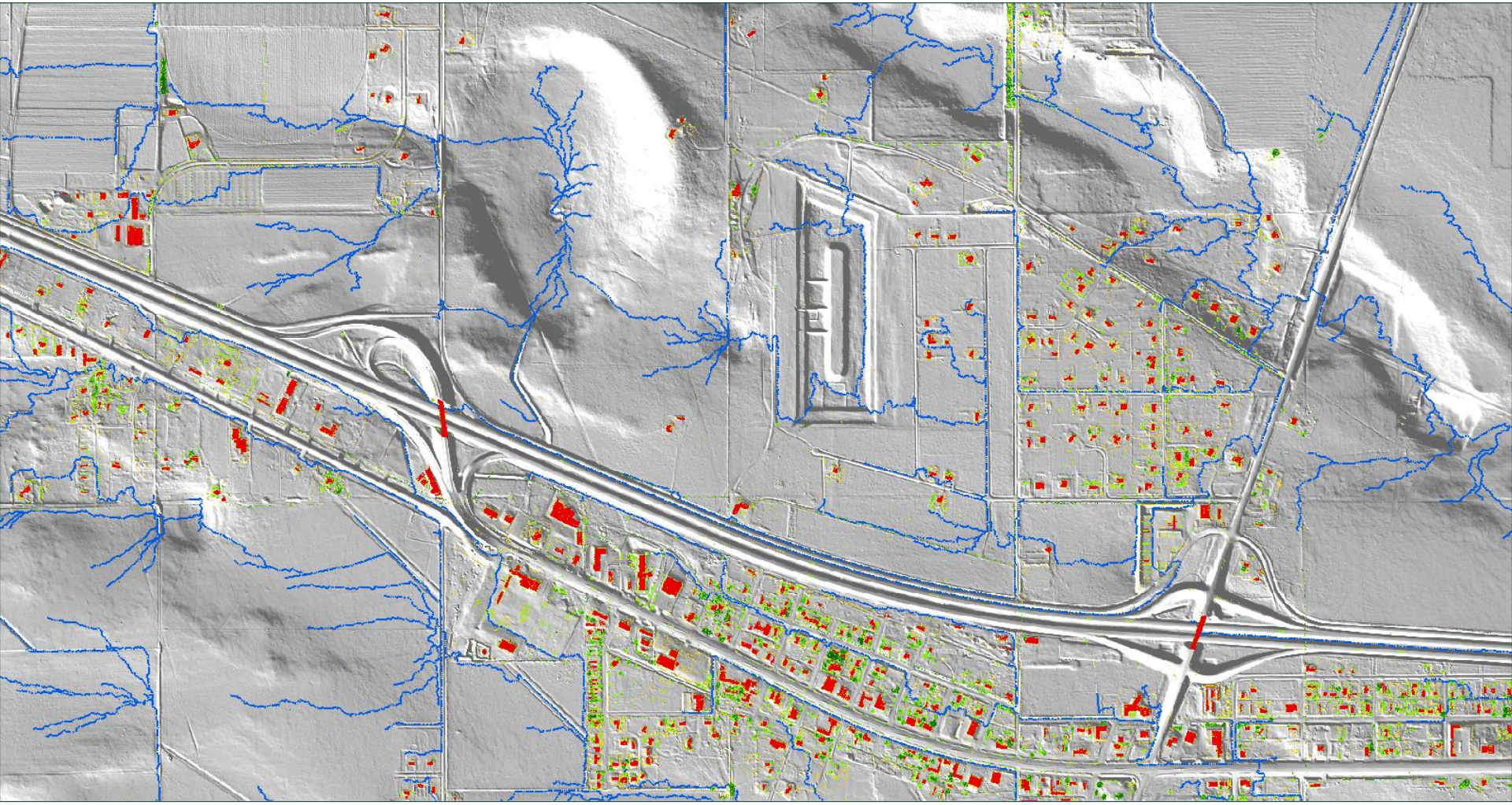
Data Source: USFS

Sensitive Watersheds for Public Water Supply



Data Source: USFS

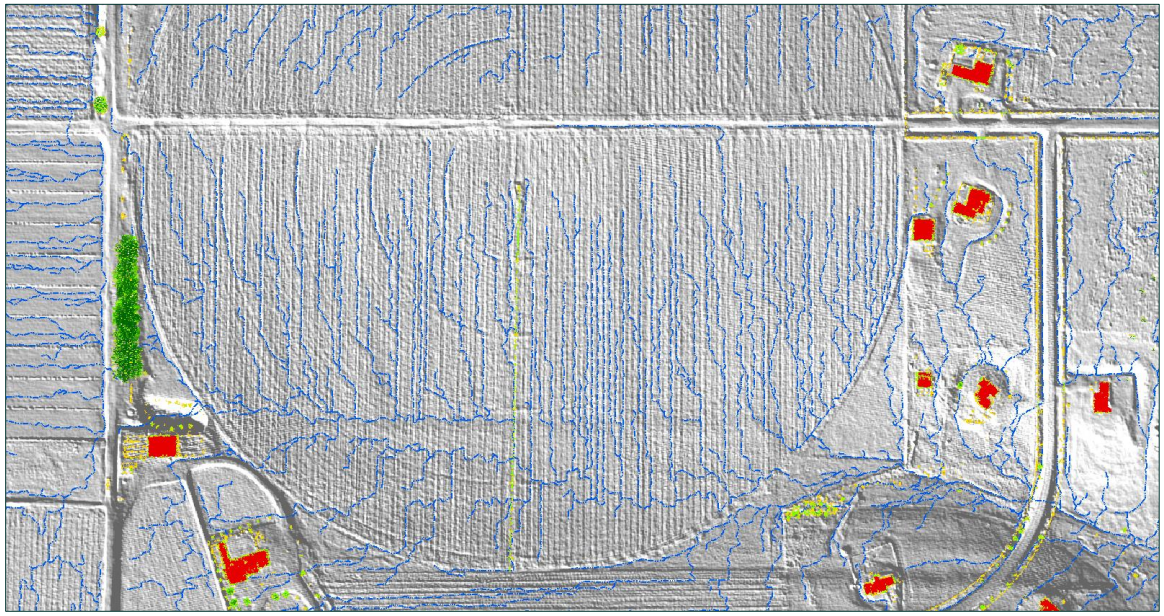
Lidar Products from the Santa Fe County Project: Moriarty



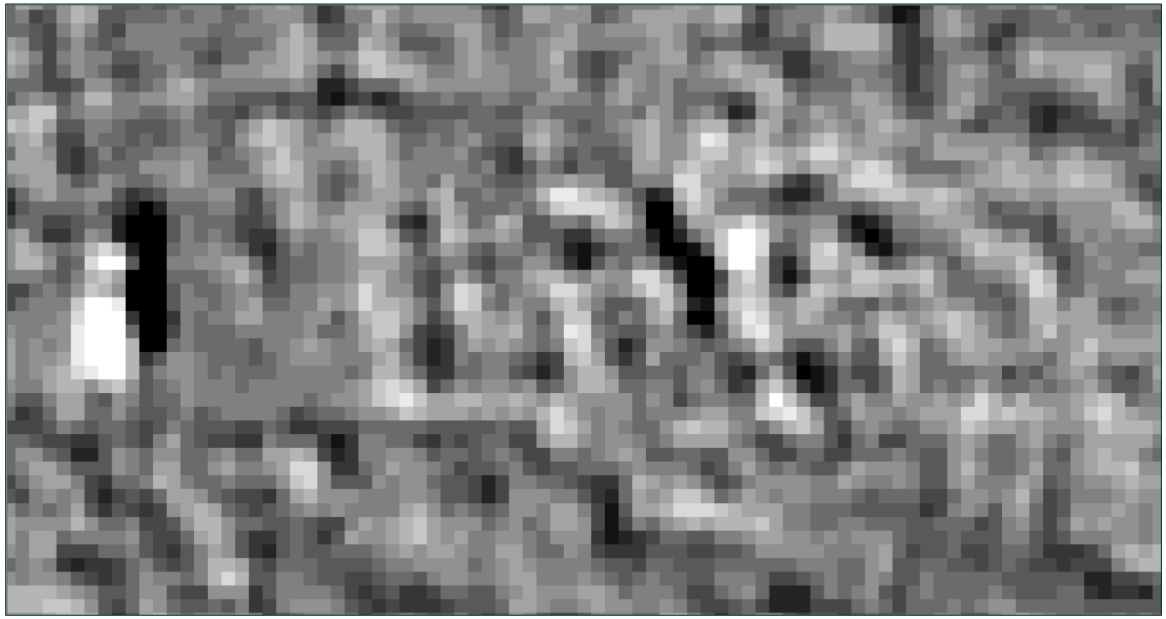
Red: Buildings > 800 sq ft area Green: Vegetative Canopy

Blue: Water Drainage/Flowlines, 3rd order and higher

Lidar Products from the Santa Fe County Project: Moriarty

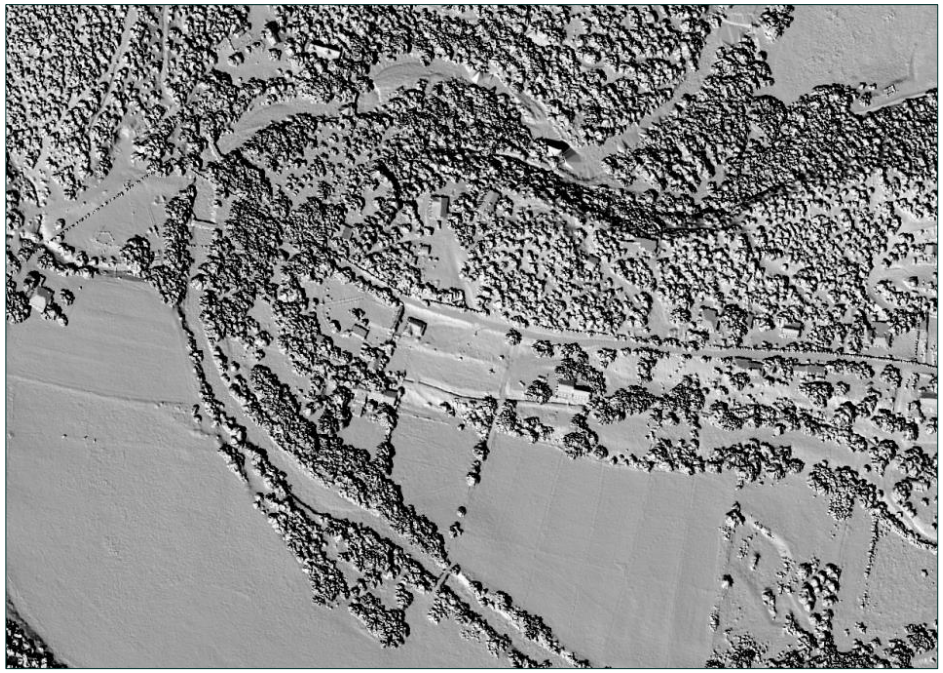


Close-up, 1:2,000 scale
Center-pivot irrigation
with drainage/flowlines
Derived from Lidar



Close-up, 1:2,000 scale
Derived from 10-m NED

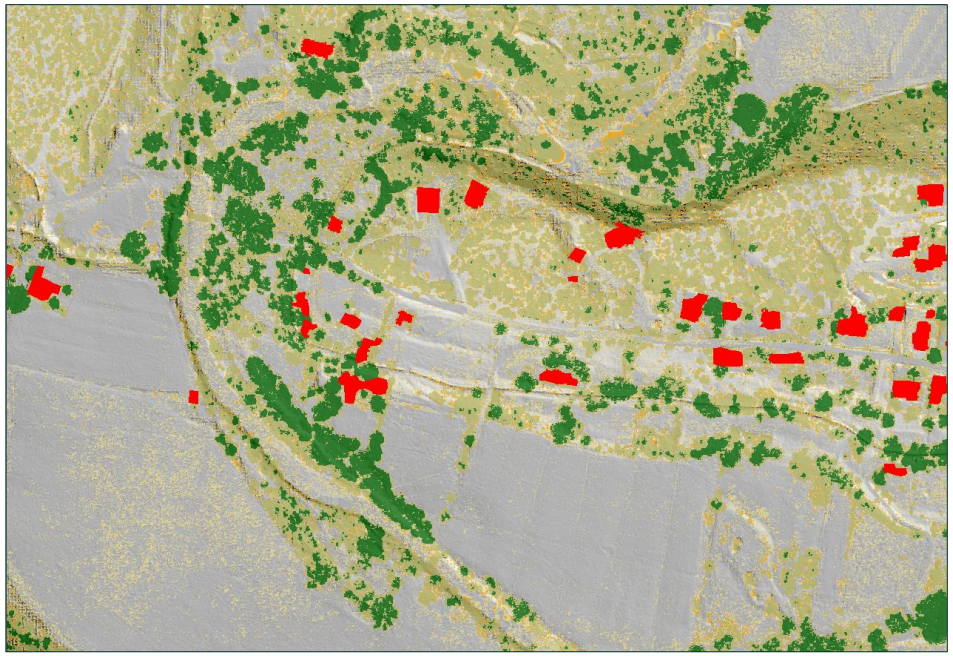
Examples of Lidar Products (Upper Pecos)



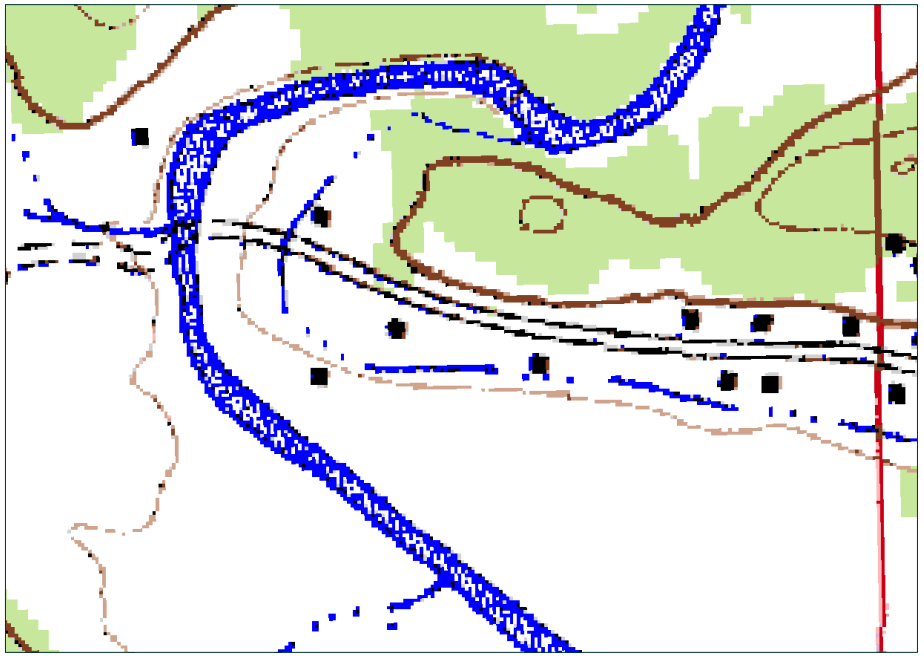
First Return/Shaded Relief
Derived from Lidar
2-ft resolution
10-cm (0.3-ft) elevation

Aerial Photo
NAIP 2014
1-m (3.3-ft) resolution
No elevation

Examples of Lidar Products (Upper Pecos)



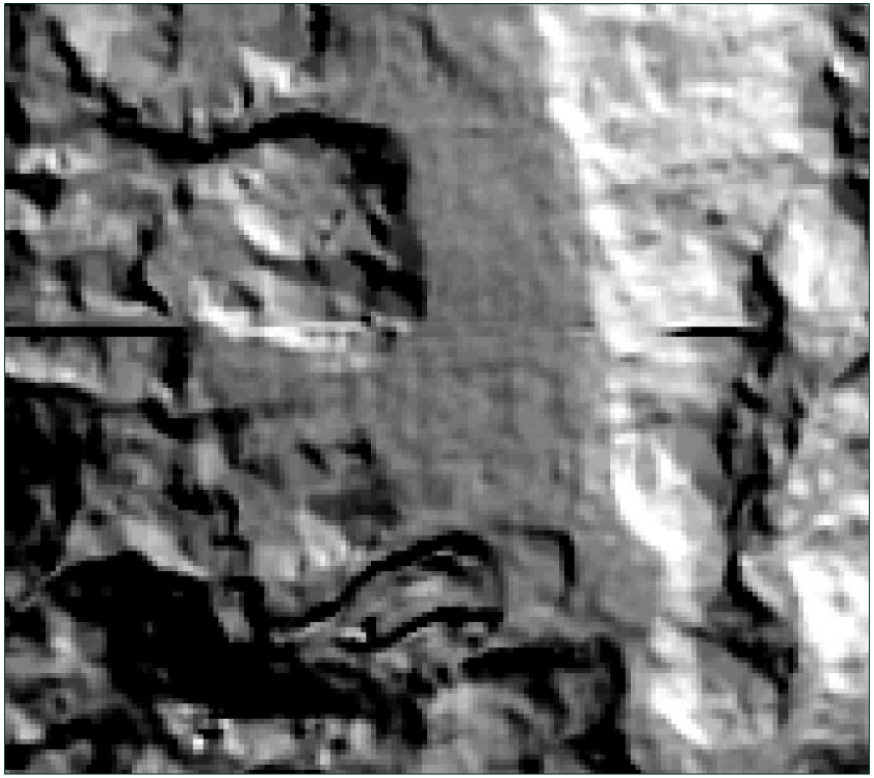
Buildings and Canopy
Derived from Lidar Point Cloud
Elevation Data

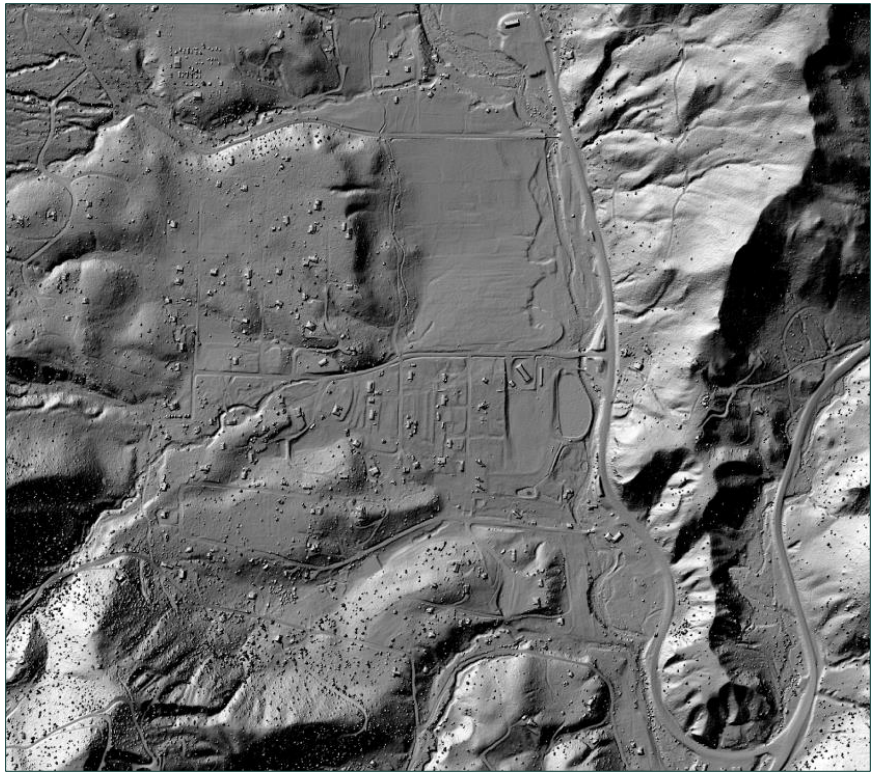


DRG (Digital Raster Graphic)
Digitized from 7.5" Quad
No Elevation Data

Red: Building > 200 sq ft area
Dk Green: Tree > 20 ft
Khaki: Woodland, Small Tree 4–20 ft
Orange: Shrubland 0.5–4 ft
Goldenrod: Herbaceous Cover 1–6 in

Questions?





Remember: Better Land Characterization → More Accurate Results!

Thank You

NM Statewide Lidar Acquisition: Contacts

Gar Clarke	NM DoIT, NM GAC Chair	george.clarke@state.nm.us
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